THE DIETETIC AND GENERAL MANAGEMENT OF TYPHOID FEVER IN CHILDREN.[1]

By Charles Gilmore Kerley, M.D.,

PROFESSOR IN PEDIATRICS, NEW YORK POLYCLINIC, MEDICAL SCHOOL AND HOSPITAL; ATTENDING PHYSICIAN, NEW YORK NURSERY AND CHILD'S HOSPITAL; ASSISTANT ATTENDING PHYSICIAN, BABIES' HOSPITAL, NEW YORK.

In the selection of food for children in health we are governed by certain well-recognized principles. For proper growth and right development both physical and mental, the food given must be of adequate nutritional value. This constitutes the science of feeding. It must be prepared so that it may be assimilated by the organism. There must be a variety in form and it must be attractive to the senses of taste and smell, and this is the art of feeding.

In illness we have the same child to deal with and the same factors are in control and must be respected even in greater degree than in health, for then we have not that margin for error which health permits. The child ill requires food of a definite nutritional value in assimilable form. This is the science of feeding in sick children. It requires variety and it is necessary that the food selected be made agreeable to the patient, and this is the art of feeding in sick children.

There is no ready-made diet in any illness in a child, neither is there one ready-made scheme for the artificial feeding of infants ill with digestive derangements. Feeding, then, both in sickness and in health, is an art as well as a science, and in the feeding of sick children the art is of equal importance with science. I find it necessary at the onset of every illness to discontinue milk and so-called solid foods, for the reason that in every illness in a child the capacity for food is lessened, and to what degree it is lessened I make it my business to find out. I give a laxative sufficient to produce a few watery evacuations. As a temporary diet, the child is given flavored gruels and perhaps one of the dried milk foods, until the nature of the illness is determined. In typhoid fever the diagnosis is rarely made under a week of observation.

Following out the above management, when the diagnosis is established, we have an intestine free from distention with gas and undigested milk, and we have consequently a patient less toxic and with a lower temperature than would have been the case had freer feedings been allowed. With the diagnosis of typhoid fever positive, I dictate a list of permissible food articles. We will assume that the patient is five years of age. The diet schedule includes gruels, usually two ounces of the cereal to the pint of water. Gruels are made palatable and their nutritional value increased by the addition of broths or milk sugar or sherry wine. Cereals very thoroughly cooked such as rice, farina, and cream of wheat are served with butter and cane or malt sugar or with maple syrup and butter. Milk foods are rarely given oftener than once a day. Among those used are matzoom, kumyss, Eiweiss Milch of Finkelstein, and skimmed milk. The latter is always given mixed with a gruel and rarely oftener than once a day. The whites of two, three, or four eggs are given daily with orange juice, or frozen with orange juice and cane sugar and served in the form of a sherbet. Lemonade and weak tea, both with the addition of cane sugar, are given between the regular feedings. Early in the convalescence scraped rare steak, custard, soft boiled egg, and junket are allowed. It is advisable to feed the patient lightly for the first few days, until the organism adjusts itself and adapts itself to its changed condition, when freer feeding may be allowed.

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[1] Read before the Section on Diseases of Children at the New York Academy of Medicine, November 9, 1911.

It is entirely wrong to assume that the diet we begin with must be continued throughout the attack. Food will be tolerated during the latter part of an illness which could not be taken during the earlier stages. Feedings are given never oftener than at three-hour intervals or less than four hours, in quantities that we know from observation the child will be able to take care of. One of the reasons for the considerable variety is that children soon "go stale" on any one article of diet; if given persistently, it is refused or taken in small quantities. If it is forced, it is very apt to be vomited; or if retained, the child in all probability will not digest it.

The diet schedule for our typhoid patient, aged five years, would be something as follows:

6 A.M. Eight ounces of gruel with sugar or a small amount of broth added. Zwieback or dried bread and butter.

8 A.M. A drink of weak tea with sugar or the whites of one or two eggs with sugar in orange juice.

10 A.M. Farina, cream of wheat, rice, served with butter and sugar, or maple syrup and butter. Drink of weak tea or kumyss or matzoom, or perhaps a dried milk food, such as malted milk or Nestle's Food.

2 P.M. Eight ounces kumyss, matzoom, or skimmed milk diluted with gruel. Zwieback; dried bread and butter if wanted.

4 P.M. Orange egg sherbet or a drink of lemonade or tea and sugar.

6 P.M. Cereal or gruel with sugar and butter or with broth. If skimmed milk has not been given at two o'clock it may be given with gruel at this time.

10 P.M. Gruel with sugar or broth or with wine.

It will be seen that the caloric requirements, 60 to 70 per kilo for the five-year-old child, may easily be supplied by the above arrangements of the feeding, although the diet arranged may not be an ideally balanced one. It would be high in carbohydrates, rather low in fat, and perhaps deficient in protein, particularly during the earlier period of the treatment.

Fat in considerable quantity is poorly digested by young typhoid fever patients. It may be given, however, in small amounts when mixed with other foods. Foods containing protein should not be given in considerable amount until we know something of the course of the disease. Milk, scraped beef, and soft boiled eggs are not well borne in young typhoid patients and a temporary reduction of protein is not felt by them.

Carbohydrates such as the cereals and the different sugars are readily cared for when properly prepared and administered. They supply fuel and no bi-products and do not require immediate elimination from the body. Emaciation is prevented through their action as proteid sparers. Mendel and Rose, in the *Journal of Biological Chemistry,* state they found that the excretion of creatin, induced by starvation, is inhibited in rabbits by feeding a diet of carbohydrates, absolutely free from proteins and fats. When the carbohydrates are given in liberal amounts the creatin entirely disappears from the urine. The creatin eliminated is not reduced by feeding a diet of fat alone or by a diet of fat and protein. Experimental interference with carbohydrate metabolism leads to the elimination of creatin, the presence of the creatin being due to a true tissue or endogenous metabolism.

Why not a milk diet? I have used the milk diet and have seen it used in many cases. Because of an early selection of a medical career, I came in close association with country physicians. It is on the farm and in the country village, where the well and the vault for the sake of convenience are built as close to the dwelling as possible, that we find typhoid fever a frequent visitor. I have watched many of these cases ill with typhoid fed on text-book milk, and I have seen the distended abdomen, the high, protracted temperature, the prolonged and active delirium, and later I filled out the certificate, all but the signature. These patients were given milk in copious amounts at two- and three-hour intervals, and milk constituted the sole food and drink. The milk diet is popular because many physicians have never tried any other means of feeding and it is the easiest way. It is easy for everybody but the patient, and he is not consulted. It is easy for the physician, it is easy for the nurse, it is easy for the household; it is much easier for the doctor to order so many pints of milk a day than it is to write out a diet schedule of right caloric values and explain the preparation of the foods suggested.

The mixed feeding is not employed, further, for the reason that physicians fail to realize that other foods may be taken care of easier than milk, and because of the fear of lay criticism for departing from an established practice. That many people have recovered from typhoid on the milk diet is not to be questioned. That many have not recovered is equally true. We know that typhoid fever is a disease of small mortality. In spite of former unfavorable impressions as to the milk diet in typhoid I used it early in my medical practice because I had been taught that it was right, and if the patient did not do well it was the fault of the patient, and that the system was the correct one. Another very good reason for using milk was that I have never been taught how to use anything else.

My favorable experience in intestinal diseases with a diet other than milk, together with the teaching of Dr. A. Seiber, of New York, led me to use somewhat similar means of feeding typhoid fever patients.

Mortality statistics do not teach us all that may be learned regarding the disease or a method of treatment. The time element as relates to the duration of the illness and the duration of the convalescence is important. My observation in the milk-fed cases is that the illness is more severe, increasing the danger to life, and that the duration of the illness is longer. Emaciation is much greater and the convalescence is consequently much more protracted than those fed as I have indicated. The case in which the temperature period is cut down to from fourteen to twenty days, with little emaciation and prompt convalescence, should not be put in the same class with the case in which the fever lasts from thirty to fifty days or longer, with a convalescence of three or four months, although both had typhoid fever and both recovered.

It is argued that milk is the ideal diet, and the reason given is that it contains all the nutritional elements required by the organism—fat, proteid, carbohydrate, and mineral salts—which is the truth. It is further claimed that milk may be taken in large quantities and be readily digested, which is not true in sick children. The addition of pepsin, hydrochloric acid, etc., has been of no value. I have learned that in order to have a short case and a mild case, the abdomen must be kept flat. Tympanites is an indication of danger regardless of how it is produced. On the milk diet, tympanites is the rule. On the mixed diet suggested, it is the exception. So long as I can keep the belly flat, I know I have the case reasonably well in hand.

Drugs have been of no service, except to produce an evacuation when there are not two in twenty-four hours and to control the evacuation when there are more than four in twenty-four hours.

Most children will be perfectly comfortable with a temperature of 104° or slightly over. Under such conditions no attempt at reduction is made. In most cases, restlessness and more or less irritability will appear when it goes higher. In such instances hydrotherapy in the form of the cool pack is used. The child's thorax and abdomen are wrapped in a towel at 95° and then the towel cooled by sprinkling with colder water.

For the conservation of vitality, the nervous manifestations must be controlled sufficiently so that the child gets adequate sleep. The pack with cold to the head will usually relieve the restlessness, irritability and sleeplessness.

The advantages claimed for the method of management, briefly outlined, is a milder course, shorter duration, more prompt convalescence, and usually, absence of complications.

VACCINATION AGAINST TYPHOID IN THE UNITED STATES ARMY.[1]

By A. W. Williams, M.D.,

CAPTAIN MEDICAL CORPS, UNITED STATES ARMY; ATTENDING SURGEON, PHILADELPHIA.

The British Army, on the recommendation of Sir A. E. Wright, then an officer in the British Medical Corps, first used antityphoid vaccination for the purpose of rendering troops immune to typhoid. Major F. F. Russell, of the Medical Corps of the United States Army, after a thorough investigation, made a favorable report to the Surgeon General of the use of this measure of prophylaxis, with its results in both the British and German Armies.

A Board of Medical Officers, consisting of the Surgeon General, Major Russell, and several of our distinguished members of the Medical Reserve Corps, was convened at Washington for the purpose of considering the advisability of its adoption in our Army. As a result, in the early part of 1909, on the recommendation of the Board, the War Department authorized its use in the case of volunteers for inoculation.

On the assembly of Maneuver Division on the Mexican border in the spring of last year, all of the troops, numbering 12,801, were subjected to the typhoid prophylaxis. They remained in camp for four months, from March 10 to July 10. Only 2 cases of typhoid occurred during the entire period of encampment. One case of a very mild type, occurring in a private of the hospital corps, who had not completed his immunization, having taken only two doses. The other case occurred in a civilian teamster who had not been immunized.

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[1] Read before the Section on General Medicine of the College of Physicians of Philadelphia, November 27, 1911. Published by permission of the Surgeon General.

Our results during this period are being criticized by some, who say we would not have had typhoid in the absence of the prophylactic inoculations. As our principal camps were located at San Antonio and Galveston, the existence of typhoid in these cities at that time refutes this. In the city of San Antonio there occurred during these four months 49 cases, with 19 deaths, and in Galveston 192 cases. The civil population in these cities where our principal camps were located serve as a control, and show what would have happened without typhoid prophylaxis.

In the origin and spread of typhoid fever in our army during the Spanish-American War, investigated by a Board consisting of Reed, Shakespeare, and Vaughn,[2] they reported that in certain regiments of regulars the disease developed in three to five weeks, and that more than 90 per cent. of the volunteer regiments developed the disease within eight weeks of going into camp. Among the whole body of troops there were no less than 20,000 cases between May and September. The Second Division, Seventh Army Corps, assembled at Jacksonville, Florida, with 2,000 less in numbers than the Maneuver Division, for the same length of time, same latitude, with an equally good campsite, and an artesian water supply of absolute purity, had 1,729 cases of typhoid, with 248 deaths. As Colonel Kean remarks,[3] "this division was not conspicuously unfortunate in its typhoid record for that time." It is selected for comparison on account of the close similarity of its conditions of service with those of the Maneuver Division.

This experience at the Mexican border with the Maneuver Division, so remarkable in its results, and so thoroughly convincing as to the value of vaccination against typhoid, resulted in the issuing of an order from the War Department making vaccination against typhoid compulsory in our army. This was the first instance of compulsory vaccination against typhoid as a requirement in an army. Up to October 30, 1911, 81,340 persons had been inoculated with prophylactic furnished from the Army Medical School. From the report of the Surgeon General, 1911, for the calendar years 1909 and 1910, only 11 cases of typhoid occurred among the inoculated, with no deaths, while in the non-inoculated part of the army there occurred 304 cases, with 26 deaths.

A comparison between the inoculated and non-inoculated parts of the army is shown by the fact that in 1910 the mean strength of the army numbered 76,230 American troops. Of this 17,978 had been given the typhoid prophylactic (about one-fourth of the army); only 7 cases occurred among the inoculated, with no

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[2] Origin and Spread of Typhoid Fever during the Spanish-American War (1898). Harrington's Hygiene, p. 668

[3] The Sanitary Record of the Maneuver Division. Jour. Amer. Med. Assoc., August 26, 1911.